Summary of Technical Data and Other Factors Used to Supplement the TLAT Findings

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TLAT Follow-on Work

- Subsequent to the TLAT publication of their report in March 2001, the FAA and EUROCONTROL have continued to sponsor research activities that have contributed to a better understanding of the capabilities and limitations of the three ADS-B link technologies and of multi-link configurations.
- These activities are reviewed in the following.

Additional 1090 MHz Extended Squitter Results/Factors (FAA Activities)

- Additional work since the TLAT report has provided more information concerning future interference environments.
- The following three modifications to assumption made by the TLAT for the LA2020 scenario are being evaluated.
  - Modified aircraft distribution
  - Use of an improved decoder
  - Representation of interference environment associated with new Mode-S interrogators and hybrid TCAS operation

Additional 1090 MHz Extended Squitter Results/Factors (European Activities)

- New model being developed with goal of achieving better agreement with data gathered in Frankfurt trials.
- Results obtained so far are encouraging in terms of matching the measured fruit rates.
- ADS-B performance is being evaluated.

Additional UAT Results/Factors

- The three main factors which have affected the previously-reported system performance are:
  - Correcting receiver model error produced significantly improved system performance.
  - Use of RTCA UAT MOPS specified transmitter powers and improved R-S error correction codes
  - Inclusion of severe interference scenarios from Link 16 airborne and DME ground transmissions.

Current UAT Performance Results

- UAT system performance in the TLAT scenarios has significantly improved, reaching past 150 nautical miles in both the LA 2020 and Core Europe 2015 scenarios.
- The unlikely simultaneous worst case Link 16 and DME scenarios in high density air traffic have also been examined:
  - MASPS/Eurocontrol requirements in LA 2020 met out to 150 nmi
  - Core Eurocontrol 2015 requirements met in excess of 100 nmi
- These results indicate better performance that indicated in the TLAT findings

Additional VDL Mode 4 Results/Factors (FAA Activities)

- TLAT Report concerns which were determined to require a response were addressed:
  - Refinement of receiver diversity model made small but no significant change in results
- Further examination of the honeycomb scheme did not appear to provide better results than the TLAT channel management plan.
- There is no new evidence to indicate that the VDL-4 system performance will be different than that reported by the TLAT.

Additional VDL Mode 4 Results/Factors (European Activities)

- The following modifications have been made to the multi-channel version of the VDL-M4 simulator (SPS) since the TLAT:
  - Protect the first four slots in each UTC second (these slots are used for uplink of differential GPS corrections, Directory of Service messages, and possibly TIS-B) from mobile station transmissions.
  - Include the avionics antenna gain model developed by the TLAT
  - Implement alternate top/bottom antenna transmissions.
- Additional simulations assuming a four VHF channel configuration show the system might not be able to support full equipage beyond 2007.

Summary - Results from Post-TLAT Investigations

- Additional data has been forthcoming for all 3 single link candidates:
  - 1090ES: several areas investigated where the fidelity of the simulation model needs to be improved - additional simulations planned by FAA and EUROCONTROL
  - UAT: new FAA simulation results indicated improved performance
  - VDL-M4: new FAA simulation results do not indicate a significant change in performance - new EUROCONTROL simulation results indicated limited link capacity - additional simulations planned by EUROCONTROL